AF IPW4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	10/797,422
Applicant	:	ACKERMAN, *et al.*
Filed	:	MARCH 10, 2004
Title	:	THERMAL BARRIER COATING PROTECTED BY INFILTRATED ALUMINA AND METHOD FOR PREPARING SAME
Art Unit	:	1762
Examiner	:	TUROCY, DAVID P.
Atty Docket No.	:	122802-3

Mail Stop: Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The below-identified communication(s) is (are) submitted in the above-captioned application or proceeding:

☒ Appeal Brief
☒ Amendment Fee Transmittal and Authorization to Charge Deposit Account
☒ Credit Card Payment Form

☒ The Commissioner is hereby authorized to charge payment of any fees associated with this communication, including fees under 37 C.F.R. §§ 1.16 and 1.17 or credit any overpayment to **Deposit Account Number 10-0233-GEAE-0011-DV1.**

Respectfully submitted,

Eric W. Guttag

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June 9, 2006

Patent Fee Transmittal for FY 2006

☐ Applicant(s) Claims Small Entity Status 37 C.F.R. 1.27

TOTAL AMOUNT OF PAYMENT	$500.00

Application No.	10/797,422
Filing Date	10-Mar-04
Named Inventor	ACKERMAN, *et al.*
Examiner Name	TUROCY, David P.
Art Unit	1762
Attorney Docket No.	122802-3

FEE CALCULATION

1. Filing Fees

Application Type	Description	Large Entity Code	($)	Small Entity Code	($)	Paid
Utility ☐	Basic	1011	300	2011	150	$ -
	Examination	1311	200	2311	100	$ -
	Search	1111	500	2111	250	$ -
Design ☐	Basic	1012	200	2012	100	$ -
	Examination	1312	130	2312	65	$ -
	Search	1112	100	2112	50	$ -
Plant ☐	Basic	1013	200	2013	100	$ -
	Examination	1313	160	2313	80	$ -
	Search	1113	300	2113	150	$ -
Reissue ☐	Basic	1014	300	2014	150	$ -
	Examination	1114	600	2114	300	$ -
	Search	1314	500	2314	250	$ -
Provisional ☐	Basic	1005	200	2005	100	$ -
National Stage ☐	Basic	1631	300	2631	150	$ -
	Examination	1633	200	2633	100	$ -
	Search	1632	500	2632	250	$ -

2. Extra Claim Fee

a. Claims as Filed

			Extra Claims	
Total Claims	0	- 20 =	0	x
Independent	0	- 3 =	0	x
Multiple Dependent				

Large Entity Code	($)	Small Entity Code	($)	Paid
1201	50	2201	25	$ -
1202	200	2202	100	$ -
1203	360	2203	180	$ -

b. Claims as Amended

	After Amnt		Highest Paid		Present Extra	
Total Claims		-		* =	0	x
Independent		-		** =	0	x
First Presentation of Multiple Dependent						

* Less than 20, enter 20 ** Less than 3, enter 3

Large Entity Code	($)	Small Entity Code	($)	Paid
1201	50	2201	25	$ -
1202	200	2202	100	$ -
1203	360	2203	180	$ -

3. Extra Page Fee

Total Pages		Extra Pages		Large Entity Code	($)	Small Entity Code	($)	Paid
0	-100	0	x	1081	250	2081	125	$ -

Subtotal for Application Fees

1 $ - + 2 $ - + 3 $ - = $ -

4. Additional Fees

Description	Large Entity Code	($)	Small Entity Code	($)	Paid
Extension for response first month	1251	120	2251	60	$ -
Extension for response second month	1252	450	2252	225	$ -
Extension for response third month	1253	1,020	2253	510	$ -
Extension for response fourth month	1254	1,590	2254	795	$ -
Extension for response fifth month	1255	2,160	2255	1,080	$ -
Notice of Appeal	1401	500	2401	250	
Filing a Brief in Support of an Appeal	1402	500	2402	250	$ 500
Request for Oral hearing	1403	1,000	2403	500	$ -
Petitions under 1.17(f)	1462	400	1462	400	$ -
Petitions under 1.17(g)	1463	200	1463	200	$ -
Petitions under 1.17(h)	1464	130	1464	130	$ -
Petition - public use proceeding	1451	1,510	1451	1,510	$ -
Petition to Revive - Unavoidable	1452	500	2452	250	$ -
Petition to Revive - Unintentional	1453	1,500	2453	750	$ -
Utility Issue Fee	1501	1,400	2501	700	$ -
Design Issue Fee	1502	800	2502	400	$ -
Plant Issue Fee	1503	1,100	2503	550	$ -
Reissue Issue Fee	1511	1,400	2511	700	$ -
Publication Fee	1504	300	1504	300	$ -
Statutory Disclaimer	1814	130	2814	65	$ -

(cont.)

Description (cont.)	Large Entity Code	($)	Small Entity Code	($)	Paid
Recording each Assignment	8021	40	8021	40	$ -
Submission of IDS	1806	180	1806	180	$ -
Request for Cont. Examination (RCE)	1801	790	2801	395	$ -
Filing Submission After Final	1809	790	2809	395	$ -
Surcharge - late filing fee or oath	1051	130	2051	65	$ -
Surcharge - late provisional fee	1052	50	2052	25	$ -
Non-English Specification	1053	130	1053	130	$ -
Processing Fee 37 CFR 1.17(q)	1807	50	1807	50	$ -
Request for *Ex Parte* Reexamination	1812	2,520	1812	2,520	$ -
Request Pub. of SIR prior to action	1804	920	1804	920	$ -
Request Pub. of SIR after action	1805	1,840	1805	1,840	$ -
Each Add. Invention Examined	1810	790	2810	395	$ -
Expedited Examination (Design)	1802	900	1802	900	$ -
Unintentionally Delayed Priority Claim	1453	1,370	1453	1,370	$ -
Certificate of Correction	1811	100	1811	100	$ -
Maintenance Fees 3.5 years	1551	900	2551	450	$ -
Maintenance Fees 7.5 years	1552	2,300	2552	1,150	$ -
Maintenance Fees 11.5 years	1553	3,800	2553	1,900	$ -
Surcharge - Late Payment 6 mos.	1554	130	2554	65	$ -
Other fee _____					$ -

Additional Fee Subtotal 4 $ 500

METHOD OF PAYMENT (Check all that apply)

☑ **Credit Card** (Provide credit card information and authorization on PTO-2038)

☑ **Deposit Account No.** **10-0233-GEAE-0011-DV1**

For the above-identified deposit account, the Director is hereby authorized to:

☐ To charge the above-identified fee.

☑ To charge any additional fees which may be required under 37 CFR 1.16, 1.17, 1.18, 1.20 and 1.492 or credit any overpayment to the deposit account number listed above.

Submitted by:			
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Eric W. Guttag — June 9, 2006

Signature — Date

Revised 01-2006

Include duplicate copy if paying by deposit account

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application No.	:	10/797,422
Applicant	:	JOHN F. ACKERMAN, *et al.*
Filed	:	MARCH 10, 2004
Title	:	THERMAL BARRIER COATING PROTECTED BY INFILTRATED ALUMINA AND METHOD FOR PREPARING SAME
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P.O. Box 1450
Alexandria, VA 22313-1450

APPELLANTS BRIEF

Sir:

This is an appeal of Claims 17-30 and 32-38 currently pending in the above application that were rejected by the Examiner in an Office Action (made FINAL) dated January 17, 2006. A timely Notice of Appeal was submitted by Appellants to the Patent and Trademark Office on April 11, 2006. Appellants Brief is being timely submitted herewith in support of their appeal to the Board of Appeals and Patent Interferences (Board), together with the requisite fee of $500.00.

REAL PARTY IN INTEREST

The real party in interest is The General Electric Company, the assignee of the above application.

RELATED APPEALS AND INTERFERENCES

There are currently no appeals or interferences known to Appellants, Appellants' legal representative, or the assignee that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

STATUS OF CLAIMS

Claims 17-30 and 32-38 are currently pending and are the only rejected claims on appeal. A clean copy of Claims 17-30 and 32-38 on appeal appears in the attached Claims Appendix.

STATUS OF AMENDMENTS

An amendment after final rejection was filed by Appellants on March 17, 2006 pursuant to 37 CFR 1.116(b) in response to the Final Office Action dated January 17, 2006. An Advisory Action was issued and mailed out on April 5, 2006. The Advisory Action indicated that the amendment after final rejection did not place the above application in condition for allowance, but that the proposed amendments would be entered for the purposes of appeal. The attached Claims Appendix reflects Claims 17-30 and 32-38 as recited in the amendment after final rejection which was entered by the Advisory Action for the purposes of appeal.

SUMMARY OF THE INVENTION

Appellants' claimed invention relates to a method for preparing a thermal barrier coating 22 protected by infiltrated alumina that overlies a metal substrate 14. This method comprises the steps of: (1) providing thermal barrier coating 22 overlaying metal substrate 14, where thermal barrier coating 22 includes porous outer layer 30 having exposed surface 34 and comprising a non-alumina ceramic thermal barrier coating material in an amount up to 100%; (2) treating porous outer layer 30 with liquid composition 38 comprising an alumina precursor to infiltrate porous outer layer 30 with the alumina precursor in an amount sufficient to provide, when converted to alumina, at least partial protection of thermal barrier coating 22 against environmental contaminants that become deposited on exposed surface 34; and (3) converting in situ the infiltrated alumina precursor within porous outer layer 30 to alumina (see, for example, Claims 17 and 32). See paragraphs [0010] at page 4, [0032] at page 13 and paragraph [0034] at page 14 of the above application, as well as the drawing FIG.

Porous outer layer 30 may be formed on a bond coat layer 18 adjacent to and overlaying metal substrate 14 (see Claim 18). See paragraph [0022] at page 9 of the above

application. Liquid composition 38 may comprise from about 5 to about 50% (more typically from about 10 to about 20%) alumina precursor (see Claims 19-20 and 33) which may be selected from aluminum alkoxides, aluminum β-diketonates, aluminum alkyls and alumina sols (see Claim 21-22 and 33-34). See paragraph [0029] at page 12 of the above application. Liquid composition 38 may be aqueous (see Claim 27 and 37) and may further comprise a polar organic liquid solvent (see Claim 28). See paragraph [0029] at page 12 of the above application.

Porous outer layer 34 may be treated with liquid composition 38 for a period of from about 0.1 to about 30 (more typically from about 1 to about 5) minutes (see Claims 29-30). See paragraph [0030] at pages 12-13 of the above application. The infiltrated alumina precursor may be heated (*e.g.*, to a temperature of at least about 1200°F for a period of at least about 2 hours) to thermally convert the precursor to the alumina (see Claims 24-25 and 35), for example, as finely divided alpha-alumina (see Claims 26 and 36). See paragraph [0032] at page 13 of the above application. Porous outer layer 34 may also be treated with liquid composition 38 while the turbine component is in an assembled state (see Claims 32-37) and where the treated thermal barrier coating 22 is a refurbished thermal barrier coating (see Claim 38). See paragraph [0034] at page 14 of the above application.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

There are three grounds of rejection to be reviewed on this appeal. The first ground of rejection is whether Claims 17-25, 27-30, 32-35 and 37 are unpatentable under 35 U.S.C. § 103(a) over U.S. Patent 5,324,544 (hereafter referred to as "Spence et al."), in view of U.S. Patent 5,871,820 (hereafter referred to as "Hasz et al."). The second ground of rejection is whether Claims 26 and 36 are unpatentable under 35 U.S.C. § 103(a) over Spence et al., in view of Hasz et al., and further in view of pages 11, and 752-53 from Volume 4 of the Engineered Materials Handbook (hereafter referred to as "Ceramics and Glasses"). The third ground of rejection is whether Claims 32 and 38 are unpatentable under 35 U.S.C. § 103(a) over U.S. Patent 6,274,193 (hereafter referred to as "Rigney et al."), in view of Spence et al., and in view of Hasz et al.

ARGUMENT

A. REJECTION OF CLAIMS 17-25, 27-30, 32-35 AND 37 UNDER 35 U.S.C. § 103(a) AS UNPATENTABLE OVER SPENCE ET AL., IN VIEW OF HASZ ET AL.

In rejecting Claims 17-25, 27-30, 32-35 and 37 under 35 U.S.C. § 103(a) as unpatentable over Spence et al., in view of Hasz et al., the Examiner has erred in the Final Office Action for at least the following five reasons: (1) Spence et al. does not teach or suggest infiltrating the porous outer layer of the thermal barrier coating with an alumina precursor according to the method of Claims 17-25, 27-30, 32-35 and 37; (2) there is no properly alleged motivation for combining the teachings of Hasz et al. with those of Spence et al.; (3) even if properly combinable with Spence et al., Hasz et al. still fails to teach or suggest infiltrating the porous outer layer of a thermal barrier coating with an alumina precursor according to the method of Claims 17-25 27-30, 32-35 and 37; (4) Spence et al., even in view of Hasz et al., fails to teach or suggest the claimed period of time for treating the outer layer according to Claims 29-30; and (5) contrary to 37 CFR 1.104(c)(2), the Final Office Action never specifically identifies where Spence et al. or Hasz et al., separately or in combination, teach or suggest a turbine component that is in an assembled state when the porous outer layer is treated with the liquid composition according to Claims 32-35 and 37.

1. SPENCE ET AL. DOES NOT TEACH OR SUGGEST INFILTRATING THE POROUS OUTER LAYER OF THE THERMAL BARRIER COATING WITH AN ALUMINA PRECURSOR ACCORDING TO THE METHOD OF CLAIMS 17-25, 27-30, 32-35 AND 37.

Contrary to what the Final Office Action or Advisory Action suggest, Spence et al. does not teach or suggest the method of Claims 17-25, 27-30, 32-35 and 37. In particular, Spence et al. does not teach or suggest infiltrating the porous outer layer of the thermal barrier coating with an alumina precursor according to the claimed method. See step (2) of Claims 17 and 30. Instead, Spence et al. teaches coating the fuel contacting surface of a metallic substrate/component with a thin, high temperature resistant layer of alumina and silica deposited from a sol-gel. See column 3, lines 17-22. Nowhere does Spence et al. teach or suggest that the deposited sol-gel infiltrates the fuel contacting surface of the metallic substrate/component, much less a porous outer layer of a thermal barrier coating as in the claimed method.

At page 2 of the Final Office Action alleges that "infiltrating" is defined by "Webster's online dictionary" as "to cause to permeate something" and that "impregnating" is defined by "Webster's online dictionary" as "to cause to be permeated." Unfortunately, and in violation of 37 CFR 1.104(c)(2), the Final Office Action, as well as the subsequent Advisory Action, has failed to provide Appellants, as they have requested, a copy of the alleged definitions from "Webster's online dictionary" or where Appellants might obtain such definitions on the Internet because the designation "Webster's online dictionary" does not adequately provide sufficient information to understand or obtain these definitions. Unless Appellants are provided with copies of these definitions relied on in the Final Office Action or are provided with sufficient information as to where these definitions from "Webster's online dictionary" can be obtained, Appellants have no way of verifying whether these definitions are correct or are the only definitions provided by "Webster's online dictionary" for the two indicated terms. In fact, because the Final Office Action, as well as the Advisory Action, has failed to provide the requested copies of these definitions or where these definitions might be obtained, in violation of 37 CFR 1.104(c)(2), the Board is respectfully requested to give no absolutely weight to these alleged definitions from "Webster's online dictionary."

Page 4 of the Final Office Action, as well as page 3 of the Advisory Action, further allege that "infiltrating" is synonymous with "impregnating," and then rely on the case of *In re Marra*, 141 USPQ 221 (CCPA 1964) for the position that "the art does not recognize any distinction between coating and impregnating." The Final Office Action, as well as the Advisory Action, thus appear to suggest, by some strained logic, that the terms "coating" and "infiltrating" are equivalent.

Even assuming that the definitions not provided by the Final Office Action or the Advisory Action are correct for the two indicated terms, the suggestion that the terms "coating" and "infiltrating" are somehow equivalent with regard to the method of Claims 17-25, 27-30, 32-35 and 37 is unsupportable in view of the art relied on (*i.e.*, Spence et al and Hasz et al). It is certainly not supported by the case of *In re Marra*. The case of *In re Marra* involved a rejection of a claimed process for sizing paper by applying a coating composition comprising a ketene dimer to a cellulose paper web. One of the references (Keim et al.) relied on in this rejection taught the use of the claimed ketene dimer in sizing paper.

The Board's attention is respectfully directed to the following relevant paragraph from pages 223-224 of the *In re Marra* case:

> We have difficulty accepting the distinction urged by appellants that "coating" differs from "impregnating" in this case. It would appear that a porous material like paper would be impregnated to some extent by an aqueous composition applied "by various coating techniques" as Keim et al. suggests, whether the composition is called "coating" or "impregnating." It seems doubtful that a clearly defined interface between the paper and the coating would result. The differences between coating compositions and impregnating compositions, according to appellants, are in dilution and viscosity. That is, a "coating composition usually has a high-solids content and a relatively high viscosity." It is clear that none of the claims have any limitations on dilution (solids content) or viscosity. The method claim merely recites "applying" the composition which would appear to include both "coating" and "impregnating," and there is no evidence that the art recognizes a distinction. Accordingly, we see not justification for concluding that it is unobvious to employ a sizing agent in either a "coating" composition or an "impregnating" composition. (Emphasis added.)

As the above quoted paragraph from the *In re Marra* case clearly demonstrates, the material (*i.e.*, paper) on which the "coating composition" was to be applied was itself porous, and therefore the "coating composition" would inherently "impregnate" this porous material. Accordingly, the Final Office Action, as well as the Advisory Action, are citing the *In re Marra* case completely out of context, and to improperly justify the strained and unsupportable logic that "coating" and "infiltrating" are somehow art recognized equivalents with regard to the method of Claims 17-25, 27-30, 32-35 and 37.

2. THERE IS NO PROPERLY ALLEGED MOTIVATION FOR COMBINING THE TEACHINGS OF HASZ ET AL. WITH THOSE OF SPENCE ET AL.

The Final Office Action also improperly combines the teachings of Hasz et al. with those of Spence et al. To properly combine the teachings of Hasz et al. with those of Spence et al, the Final Office Action must allege some proper motivation for one skilled in the art to do so. *See, e.g., In re Fine*, 837 F.2d 1071, 1075, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988) ("teachings of references can be combined only if there is some suggestion or incentive to do so"); *In re Dance*, 160 F.3d 1339, 1343, 48 U.S.P.Q.2d 1635, 1637 (Fed. Cir. 1998) (there must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant).

Pages 2-3 of the Final Office Action, as well as pages 2-3 of the Advisory Action,

allege that it would be obvious to modify Spence et al. "to use a protective coating on a thermal barrier coating as suggested by [Hasz et al.] to provide desirable protection from environmental contaminants because [Spence et al.] teaches applying an alumina/silicon coating protects various substrates, including ceramic, from contaminants and [Hasz et al.] teaches thermal barrier coatings, with outer layers of ceramic, benefit from a contaminant protective coating." The alleged "motivation" for combining these references is essentially as follows: (1) Hasz et al. allegedly shows that thermal barrier coatings comprising an alumina barrier layer and a bond coating are susceptible to various modes of damage from contaminants; (2) Hasz et al. allegedly discloses the contaminants as materials that are in the engine which deposit on the surface of the engine part, from air and fuel sources, and impurities to oxidations products and only uses CMAS as an "exemplary showing"; (3) Spence et al. and Hasz et al. are relevant art because they both allegedly teach protecting turbine engine parts from contaminants; and (4) Spence et al. teaches applying an alumina/silicon coating to protect various substrates, including ceramic, from contaminants, while Hasz et al. teaches thermal barrier coatings with outer layers of ceramic benefit from a contaminant protective coating.

In fact, and contrary to what the Final Office Action and Advisory Action suggest, Spence et al. and Hasz et al. are not directed at protecting against the same or even similar environmental contaminants. As acknowledged by page 3 of the Final Office Action, as well as page 3 the Advisory Action, Spence et al. is directed at inhibiting carbon deposits (*e.g.*, coke formation) on metallic substrates (see column 1, lines 11-13, and column 3 lines 9-11). By contrast, Hasz et al. is directed at protecting the coating against infiltration of different environmental contaminants, namely CMAS (see column 1, lines 63-67) and iron oxides (see column 2, lines 32-35). Contrary to what the Final Office Action or Advisory Action suggest, CMAS is not simply "exemplary" but is the primary environmental contaminant (other than iron oxides) that Hasz et al. is directed at protecting against. In addition, Hasz et al makes no reference to protecting against either "carbon deposits" or "coke formation" as in Spence et al. Accordingly, the Final Office Action has provided no proper "motivation to combine" the teachings of Hasz et al. with those of Spence et al.

Page 3 of the Advisory Action further alleges that "the prior art can be modified or combined to reject claims as prima face obvious as long as there is a reasonable expectation

of success," citing *In re Merck*, 231 USPQ 375. The Advisory Action is citing *In re Merck* completely out of context. In the case of *In re Merck*, the claimed invention was directed to the use of the drug amitriptyline to treat human mental disorders. This use of amitriptyline was rejected as obvious over references disclosing a structurally closely related drug (impiparamine), where the claimed amitriptyline and the disclosed impiparamine were both known to be psychotropic drugs. See 231 USPQ at 379. Unlike the situation in *In re Merck*, Spence et al. and Hasz et al. are simply not directed at protecting against the same or even similar environmental contaminants. There is thus no proper basis for combining the teachings of Hasz et al. with those of Spence et al. relative to the method of Claims 17-25, 27-30, 32-35 and 37.

3. EVEN IF PROPERLY COMBINABLE WITH SPENCE ET AL., HASZ ET AL. STILL FAILS TO TEACH OR SUGGEST INFILTRATING THE POROUS OUTER LAYER OF A THERMAL BARRIER COATING WITH AN ALUMINA PRECURSOR ACCORDING TO THE METHOD OF CLAIMS 17-25, 27-30, 32-35 AND 37.

Even if properly combinable with Spence et al., Hasz et al. still fails to teach or suggest infiltrating the porous outer layer of a thermal barrier coating with an alumina precursor according to the method of Claims 17-25, 27-30, 32-35 and 37. Instead, Hasz et al. forms an impermeable barrier coating on the thermal barrier coating, whether it is deposited from a sol-gel or otherwise. Nowhere does Hasz et al. teach or suggest that the deposited sol-gel infiltrates a porous outer layer of the thermal barrier coating as in the claimed method. In fact, nowhere does Hasz et al. teach or suggest that the sol-gel infiltrates the thermal barrier coating as an alumina precursor that is then converted in situ to alumina. See step (3) of Claims 17 and 32.

Page 4 of the Final Office Action, as well as page 4 of the Advisory Action, again rely on the strained and unsupportable logic that, because the definitions of "infiltrating" and "impregnating," are allegedly synonymous, "infiltrating" is equivalent to "coating" because there is no art recognized difference between "impregnating" and "coating" in view of *In re Marra*. In addition, the Final Office Action and the Advisory Action, while agreeing that Hasz et al. discloses forming an impermeable coating, nonetheless allege that the thermal barrier coating protected by the Hasz et al. impermeable coating must "necessarily" have some degree of porosity such that this impermeable coating would "infiltrate" the underlying

thermal barrier coating. What the Final Office Action and Advisory Action allege about the "porosity" of the thermal barrier coating is unsupported speculation not taught by Hasz et al. In particular, nothing in Hasz et al. teaches or suggests that the thermal barrier coating would have sufficient porosity to permit infiltration of the impermeable coating.

In fact, Appellants have previously requested the Examiner to provide an affidavit/declaration under 37 CFR 1.104(d)(2) to support what appears to be a belief based on his own personal knowledge which is not supported by the art relied on. To date, the Examiner has yet to provide the requested affidavit/declaration under 37 CFR 1.104(d)(2) in support of this belief apparently based on his personal knowledge. Accordingly, the Board is respectfully requested to give absolutely no weight to this completely unsupported speculation about the "porosity" of the Hasz et al. thermal barrier coating.

In addition, the benefit suggested by Hasz et al. for their impermeable coating appears to be to prevent any flow of contaminants into the underlying thermal barrier coating. By contrast, infiltrating and then converting alumina in situ within the porous outer layer according to the instant Claims provides a reservoir of alumina that can react with the contaminants to form a phase with a higher melting point. This alumina reservoir thus "freezes" the contaminants and does not permit these "frozen" contaminants to further penetrate into the thermal barrier coating, nor go through cyclic liquid-solid-liquid phase transformations that can undesirably stress and crack the thermal barrier coating. Such a benefit for infiltrating alumina within a porous outer layer is not taught at all by Hasz et al., or Spence et al.

Indeed, neither Spence et al., nor Hasz et al., suggest that their respective surface/component or thermal barrier coating are in anyway porous such that the applied coating would inherently infiltrate the surface/component or thermal barrier coating. In fact, Spence et al. and Hasz et al. would suggest just the opposite. Each of these references teaches a separate coating layer on top of the respective surface/component or thermal barrier coating. In other words, there is a "clearly defined interface between" the applied coating of Spence et al. and Hasz et al., and the respective surface/component or thermal barrier coating.

The paragraph bridging pages 4-5 of the Final Office Action, as well as page 5 of the Advisory Action, allege that Appellants rely on a feature (reservoir of alumina to react with the contaminants) that is not recited in the Claims. The Advisory Action also cites *In re Van*

Geuns, 26 USPQ2d 1057 (Fed. Cir. 1993) for the proposition that "limitations from the specification are not read into the claims." The Advisory Action's reliance on *In re Van Geuns* is misplaced. In the case of *In re Van Geuns*, the applicant argued that the art did not make the claimed "uniform magnetic field" limitation obvious because this art did not teach a level of magnetic field uniformity required for NMR imaging. The Federal Circuit responded that the claim was not expressly limited to NMR or MRI apparatus.

By contrast, the method of Claims 17-25, 27-30, 32-35 and 37 specifically recites that the infiltrated alumina precursor should be "in an amount sufficient to provide, when converted to alumina, at least partial protection of the thermal barrier coating against environmental contaminants that become deposited on the exposed surface." See step (2) of Claims 17 and 30. In other words, this claimed amount of infiltrated alumina present within the porous outer layer is the "reservoir of alumina." What Appellants have pointed out is simply the inherent benefit of having this claimed amount of infiltrated alumina present within the porous outer layer. See paragraph [0033] at page 14 of the above application where the benefit of this claimed amount of infiltrated alumina is described.

4. SPENCE ET AL., EVEN IN VIEW OF HASZ ET AL., FAILS TO TEACH THE CLAIMED PERIOD OF TIME FOR TREATING THE OUTER LAYER ACCORDING TO CLAIMS 29-30.

In rejecting Claims 29-30, page 5 of the Final Office Action, as well as page 5 of the Advisory Action, concedes that Spence et al., even in view of Hasz et al., fails to teach the claimed period of time for treating the outer layer. But page 5 of the Final Office Action, as well as page 6 of the Advisory Action, take the position that the "length of treatment" is "a result effective variable," and that it would be obvious "to optimize such treatment length to insure proper coating thickness." The position of the Final Office Action and Advisory Action is simply unsupportable and improper speculation. The cited case law (*In re Boesch*) regarding selecting "optimum values" is irrelevant because, as even the Final Office Action and Advisory Action concede, no time periods are taught by the art relied on. Accordingly, there is no a proper basis for rejecting Claims 29-30 under 35 U.S.C. § 103(a) as unpatentable over Spence et al. in view of Hasz et al.

In fact, Appellants have previously requested the Examiner to provide an affidavit/declaration under 37 CFR 1.104(d)(2) to support what appears to be a belief based

on his own personal knowledge which is not supported by the art relied on. To date, the Examiner has yet to provide the requested affidavit/declaration under 37 CFR 1.104(d)(2) in support of this belief apparently based on his personal knowledge. Accordingly, the Board is respectfully requested to give absolutely no weight to this completely unsupported speculation about the alleged "obviousness" of the time periods defined in Claims 29-30.

5. CONTRARY TO 37 CFR 1.104(c)(2), THE FINAL OFFICE ACTION NEVER SPECIFICALLY IDENTIFIES WHERE SPENCE ET AL. OR HASZ ET AL., SEPARATELY OR IN COMBINATION, TEACH OR SUGGEST A TURBINE COMPONENT THAT IS IN AN ASSEMBLED STATE WHEN THE POROUS OUTER LAYER IS TREATED WITH THE LIQUID COMPOSITION ACCORDING TO CLAIMS 32-35 AND 37.

In rejecting Claims 32-35 and 37 as unpatentable over Spence et al., in view of Hasz et al., the Final Office Action again violates 37 CFR 1.104(c)(2). As Appellants have repeatedly pointed out, none of the Office Actions, including the Final Office Action and Advisory Action, specifically identify where Spence et al. or Hasz et al., separately or in combination, teach or suggest a turbine component that is in an assembled state when the porous outer layer is treated with the liquid composition according to Claims 32-35 and 37. Pages 5-6 of the Final Office Action, as well as page 6 of the Advisory Action, simply allege that the component taught by Spence et al. is "clearly" in an "assembled state" "where such term is given its broadest reasonable interpretation." But the Final Office Action and Advisory Action still fail to specifically identify what "component" is being referred to in Spence et al., or what the Final Office Action or Advisory Action believe the "broadest reasonable interpretation" of the term "component" is such that it corresponds to a "turbine component in an assembled state" according to Claims 32-35 and 37.

B. REJECTION OF CLAIMS 26 AND 36 UNDER 35 U.S.C. § 103(a) AS UNPATENTABLE OVER SPENCE ET AL., IN VIEW OF HASZ ET AL., AND FURTHER IN VIEW OF CERAMICS AND GLASSES

In rejecting Claims 26 and 36 under 35 USC § 103(a) as unpatentable over Spence et al., in view of Hasz et al., and further in view of Ceramics and Glasses, the Examiner in the Final Office Action has erred for at least the following two reasons: (1) Ceramics and

Glasses does not teach or suggest that the alpha alumina formed would be finely divided, as defined in Claims 26 and 36; and (2) the combination of Ceramics and Glasses with Spence et al. and Hasz et al. still fails to teach or suggest the method defined in Claims 26 or 36.

1. CERAMICS AND GLASSES DOES NOT TEACH OR SUGGEST THAT THE ALPHA ALUMINA FORMED WOULD BE FINELY DIVIDED, AS DEFINED IN CLAIMS 26 AND 36.

Ceramics and Glasses does not teach or suggest that the alpha alumina formed would be finely divided, as defined in Claims 26 and 36. In fact, the Final Office Action, as well as the Advisory Action, fails to even address *where* Ceramics and Glasses teaches or suggests that the alpha alumina formed would be finely divided.

Page 6 of the Final Office Action, as well as pages 6-7 of the Advisory Action, instead suggests that the aluminum alkoxide thermally converted to alpha alumina "must necessarily result in finely divided alpha alumina." This suggestion improperly relies on what the above application teaches, and not what Ceramics and Glasses or any of the other art relied on teaches. Without any support in the art relied on, the Final Office Action and Advisory Action also incorrectly and improperly suggest that either: (1) the above application and the art have different definitions for alpha alumina thermally converted from aluminum alkoxide; or (2) Claims 26 and 36 are using other processing steps or parameters that are not in these Claims.

In fact, Appellants have previously requested the Examiner to provide an affidavit/declaration under 37 CFR 1.104(d)(2) to support what appears to be a belief based on his own personal knowledge which is not supported by the art relied on. In the Final Office Action the Examiner says that this requested affidavit/declaration under 37 CFR 1.104(d)(2) is "not necessary," but nonetheless still relies on a belief based on his own personal knowledge which is not supported by the art relied on. To date, the Examiner has yet to provide the requested affidavit/declaration under 37 CFR 1.104(d)(2) in support of this belief apparently based on his personal knowledge. Accordingly, the Board is respectfully requested to give absolutely no weight to this completely unsupported belief as to whether aluminum alkoxide thermally converted to alpha alumina "must necessarily result in finely divided alpha alumina."

2. THE COMBINATION OF CERAMICS AND GLASSES WITH SPENCE ET AL. AND HASZ ET AL. STILL FAILS TO TEACH OR SUGGEST THE METHOD DEFINED IN CLAIMS 26 OR 36.

As previously noted, Spence et al. and Hasz et al. fail to teach or suggest infiltration of the alumina precursor within a porous outer layer of a thermal barrier coating, with subsequent conversion in situ to alumina. Accordingly, even the combination of Ceramics and Glasses with these other two references still fails to teach or suggest the method defined in Claims 26 or 36.

C. REJECTION OF CLAIMS 32 AND 38 UNDER 35 U.S.C. § 103(a) AS UNPATENTABLE OVER RIGNEY ET AL., IN VIEW OF SPENCE ET AL. AND IN VIEW OF HASZ ET AL.

In rejecting Claims 32 and 38 under 35 USC § 103(a) as unpatentable over Rigney et al., in view of Spence et al and in view of Hasz et al., the Examiner in the Final Office Action has erred for at least the following two reasons: (1) no proper motivation has been alleged for combining the teachings Spence et al. and Hasz et al. with those of Rigney et al based on what Rigney et al. teaches; and (2) the relevance of Rigney et al. to Claim 32 is never explained in the Final Office Action.

1. THERE IS NO PROPERLY ALLEGED MOTIVATION FOR COMBINING THE TEACHINGS OF SPENCE ET AL. AND HASZ ET AL. WITH THOSE OF RIGNEY ET AL. BASED ON WHAT RIGNEY ET AL. TEACHES.

Pages 6-7 of the Final Office Action, as well as pages 6-7 of the Advisory Action, allege the following "motivation" for combining Spence et al. and Hasz et al. with Rigney et al.: (1) Rigney et al. allegedly teaches repairing a damaged turbine component by removal of the entire thermal barrier coating, repairing the metal component at the discrete location of the damage, and finally reapplying the thermal barrier coating to the outside of the refurbished turbine component; (2) one would allegedly be motivated to modify Rigney et al. to apply the protective coating to the thermal barrier coating of a refurbished turbine component, as allegedly suggested by Spence et al. in view of Hasz et al., to provide a desirable protection of the a thermal barrier coating for a turbine component because; (3) Spence et al. in view of Hasz et al. discloses that a protective coating applied to a thermal barrier coating is allegedly "known in the art" to provide protection against contamination;

and (4) therefore allegedly "would be reasonably expected to effectively provide a refurbished turbine component with [an] outer thermal barrier coating with protection against contaminants."

The Final Office Action has improperly combined the teachings of Spence et al. and Hasz et al. with those of Rigney et al. To properly combine the teachings of Spence et al. and Hasz et al. with those of Rigney et al., the Final Office Action must allege some proper motivation for one skilled in the art to do so. *See, e.g., In re Fine*, 837 F.2d 1071, 1075, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988) ("teachings of references can be combined only if there is some suggestion or incentive to do so"); *In re Dance*, 160 F.3d 1339, 1343, 48 U.S.P.Q.2d 1635, 1637 (Fed. Cir. 1998) (there must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant).

The Final Office Action and the Advisory Action have failed to allege any proper basis for why one skilled in the art would be motivated to use alumina in the repair process of Rigney et al. based on what Rigney et al. would suggest. The motivation put forth by the Final Office Action and Advisory Action for using alumina in the Rigney et al. repair process is based on what Spence et al. and Hasz et al. allegedly desire for a protective coating for a component, and not what the primary reference, Rigney et al., would suggest to one skilled in the art would be a desirable material for repairing a damaged section of a coating.

In fact, Rigney et al. suggests a distinct preference for a different type of coating for its repair process, namely a diffusion aluminide coating or an overlay coating (metallic coatings), neither of which is the same or similar to alumina (a ceramic). See column 3, lines 50-58 of Rigney et al. Why one skilled in the art would be motivated to select alumina (a ceramic) over these other metallic coating materials taught for use in the Rigney et al repair process for the purposes set forth by Rigney et al. is never addressed by the Final Office Action or the Advisory Action.

2. THE RELEVANCE OF RIGNEY ET AL. TO CLAIM 32 IS NEVER EXPLAINED IN THE FINAL OFFICE ACTION.

Appellants remain puzzled as to why Claim 32 has been rejected over Rigney et al., in view of Spence et al., and in view of Hasz et al. Only Claim 38, not Claim 32, specifically defines step (1) as providing a refurbished thermal barrier coating that overlays the metal substrate of the turbine component. Indeed, the relevance of Rigney et al. to Claim 32 is never explained in the Final Office Action.

SUMMARY OF ARGUMENT AND RELIEF REQUESTED

Appellants submit that method of Claims 17-30 and 32-38 is unobvious over the prior art relied on in rejecting these Claims. None of the prior art relied on in the Final Office Action, alone or in combination, teaches or suggests: (1) infiltrating the porous outer layer of the thermal barrier coating with an alumina precursor which is converted in situ to alumina according to the method of Claims 17-25, 27-30, 32-35 and 37; (2) the claimed period of time for treating the outer layer according to Claims 29-30; (3) a turbine component that is in an assembled state when the porous outer layer is treated with the liquid composition according to Claims 32-35 and 37; or (4) that the alpha alumina formed would be finely divided, as defined in Claims 26 and 36.

In addition, there is no properly alleged motivation for combining the teachings of the references relied on in the Final Office Action in rejecting 17-30 and 32-38. In fact, the Examiner has repeatedly failed, when requested by Appellants, to provide: (1) copies of definitions of terms relied on in the Final Office Action, or where those definitions might be obtained, in violation of 37 CFR 1.104(c)(2); or affidavits/declarations under 37 CFR 1.104(d)(2) to support speculation and beliefs apparently based on the Examiner's personal knowledge and not what is taught by the art relied on. In those instances where the Examiner has failed to provide items (1) and (2), the Board is respectfully requested to give absolutely no weight to this completely unsupported speculation or belief by the Examiner.

Accordingly, Appellants respectfully request the Honorable Board of Appeals and Interferences to reverse the Examiner's rejections in the Final Office Action and remand with directions to allow the above application to issue with Claims 17-30 and 32-38 currently pending.

Respectfully submitted,
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CLAIM APPENDIX

17 A method for preparing a thermal barrier coating protected by infiltrated alumina that overlies a metal substrate, the method comprising the steps of:

1. providing a thermal barrier coating overlaying a metal substrate, the thermal barrier coating including a porous outer layer having an exposed surface and comprising a non-alumina ceramic thermal barrier coating material in an amount up to 100%;
2. treating the porous outer layer with a liquid composition comprising an alumina precursor to infiltrate the porous outer layer with the alumina precursor in an amount sufficient to provide, when converted to alumina, at least partial protection of the thermal barrier coating against environmental contaminants that become deposited on the exposed surface; and
3. converting in situ the infiltrated alumina precursor within the porous outer layer to alumina.

18. The method of claim 17 wherein a bond coat layer is adjacent to and overlies the metal substrate of step (1) and wherein the outer layer is formed on the bond coat layer.

19. The method of claim 18 wherein the liquid composition comprises from about 5 to about 50% alumina precursor.

20. The method of claim 19 wherein the liquid composition comprises from about 10 to about 20% alumina precursor.

21. The method of claim 19 wherein the alumina precursor is selected from the group consisting of aluminum alkoxides, aluminum β-diketonates, aluminum alkyls and alumina sols.

22. The method of claim 21 wherein the alumina precursor is an aluminum alkoxide selected from the group consisting of aluminum methoxides, aluminum ethoxides, aluminum propoxides, aluminum isopropoxides, aluminum butoxides, aluminum sec-butoxides and

mixtures thereof.

23. The method of claim 22 wherein step (3) comprises thermally converting the infiltrated aluminum alkoxide to alumina.

24. The method of claim 23 wherein step (3) comprises heating the infiltrated aluminum alkoxide to a temperature of at least about 1200°F for a period of at least about 2 hours.

25. The method of claim 24 wherein step (3) comprises heating the infiltrated aluminum alkoxide to a temperature of from about 1200° to about 1500°F for a period of at least about 4 hours.

26. The method of claim 23 wherein the infiltrated aluminum alkoxide is thermally converted to finely divided alpha alumina.

27. The method of claim 22 wherein the liquid composition is an aqueous composition.

28. The method of claim 27 wherein the liquid composition further comprises a polar organic liquid solvent selected from the group consisting of alcohols, aldehydes, ketones and mixtures thereof.

29. The method of claim 19 wherein the outer layer is treated with the liquid composition for a period of from about 0.1 to about 30 minutes.

30. The method of claim 29 wherein the outer layer is treated with the liquid composition for a period of from about 1 to about 5 minutes.

32. A method comprising the following steps:

1. providing a thermal barrier coating overlaying a metal substrate of a turbine component, the thermal barrier coating including a porous outer layer having an exposed surface and comprising a non-alumina ceramic thermal barrier coating material in an amount up to 100%;

2. treating the porous outer layer with a liquid composition comprising an alumina precursor to infiltrate the porous outer layer with the alumina precursor in an amount sufficient to provide, when converted to alumina, at least partial protection of the thermal barrier coating against environmental contaminants that become deposited on the exposed surface, wherein the turbine component is in an assembled state when the porous outer layer is treated with the liquid composition; and
3. converting in situ the infiltrated alumina precursor within the porous outer layer to alumina.

33. The method of claim 32 wherein the liquid composition comprises from about 5 to about 50% alumina precursor and wherein the alumina precursor is selected from the group consisting of aluminum alkoxides, aluminum β-diketonates, aluminum alkyls and alumina sols.

34. The method of claim 33 wherein the alumina precursor is an aluminum alkoxide selected from the group consisting of aluminum methoxides, aluminum ethoxides, aluminum propoxides, aluminum isopropoxides, aluminum butoxides, aluminum sec-butoxides and mixtures thereof.

35. The method of claim 34 wherein step (3) comprises thermally converting the infiltrated aluminum alkoxide to alumina.

36. The method of claim 35 wherein the infiltrated aluminum alkoxide is thermally converted to finely divided alpha alumina.

37. The method of claim 32 wherein the liquid composition is an aqueous composition.

38. The method of claim 32 wherein step (1) comprises providing a refurbished thermal barrier coating that overlays the metal substrate of the turbine component.

EVIDENCE APPENDIX

There is no other "evidence" submitted by Appellants during prosecution that is referred to in this Appeal Brief.

RELATED PROCEEDINGS APPENDIX

There have been no decisions rendered by a court or the Board in any proceedings related to this appeal.